

IN THE SPECIFICATION:

At page 1, prior to line 2, please insert the following new heading and paragraph:

CROSS REFERENCE TO RELATED APPLICATION

This application is the U.S. National Stage of International Application Number PCT/FI2003/000816 filed November 4, 2003 and published May 21, 2004 in English under International Publication Number WO 2004/043105 A1.

At page 1, please amend the paragraph beginning on line 18 as follows:

Use of the resources of a network other than the home network is ~~referenced~~referred to as roaming. The roamed network will be ~~referenced~~referred to in the following as a visited network. The visited network is typically a network run by another operator. The network can be operated either abroad or in the same country as where the home network operates.

At page 1, please amend the paragraphs beginnin on line 28 through page 2, line 5 as follows:

The costs of roaming, and especially international roaming to mobile users can be relatively high compared to home network mobile communications or Public Switched Telephone Network (PSTN) communications via, for example, fixed telephone lines from a foreign country. A reason for this is that the mobile subscriber may be subjected to costs such as international call charges, specific roaming charges and other costs not appearing in the connections in the home network. The cost factor may be especially relevant for ~~organisations~~organizations

such as big corporations, international communities and similar bodies responsible for paying the phone bills of a substantial number of travellers.

Roaming costs are present in the current billing mechanism for mobile users. Although it could be possible to rely more on fixed line connections when ~~roaming~~travelling this would mean that the advantage of mobility is lost.

At page 2, please amend the paragraph beginning on line 18 as follows:

Furthermore, users, in particular mobile users, are often accustomed to name-based dialling using for example private phonebooks stored in the user's telephone. Typically, only the most often used telephone numbers of individual persons are stored in such a private phonebook. Alternative numbers, such as numbers exploiting a company's private network or universal access numbers, are seldom stored in the private phonebooks and, consequently, are seldom used. This issue is present while roaming, but also when the terminal is in the home network.

At page 3, please amend the paragraph beginning online 1 as follows:

According to one aspect of the present invention, there is provided a method for providing routing information for establishing connections over a communication system comprising a plurality of communication networks, the method comprising storing location dependent routing information in a data storage, providing a terminal with location dependent routing information stored in the data storage and establishing a connection~~connection~~ between the terminal and at least one other terminal using location dependent routing information provided by the data storage, wherein at least one of the terminals is a mobile terminal and information for routing

the connection between the terminals is selected based on the location of the at least one mobile terminal.

At page 2, please amend the paragraphs beginning on line 25 through page 4, line 3 as follows:

The embodiments may provide a calling user with advantages of large telephone diaries and wide dialling options, which may be updated efficiently. The telephone diaries and dialling options the user is familiar with in the home network may be provided also in a visited network when roaming. The embodiments of the invention may provide means for cost-effective roaming for mobile users. Similar cost savings may be achieved also in the home network. For example, ~~optimised~~optimized and updated routing information may be used when establishing a connection abroad from the home network.

The operation may be made transparent for the user. An automatic updating of the routing information and an automatic call routing provided in accordance with certain embodiments may be used to ensure that the users will use the system, thus ensuring that benefits offered by the system are obtained. The automatic updating of the routing information and the automatic routing preferably occur without any explicit effort from the user. The embodiments of the invention may ensure that an ~~optimisation~~optimization of call routing may be affected.

At page 4, please amend the paragraph beginning on line 17 as follows:

Figure 1 shows a schematic system for providing connection between a mobile terminal 12 and another terminal 16 in a communication system 100. The

communication system 100 may comprise a network provided by an operator or more than one ~~networks~~network provided by more than one ~~operators~~operator. A data storage 102 is also provided for storing location dependent information. The data storage 102 may be connected to the communication system 100 in various ways, as will be explained in the following.

At page 6, please amend the paragraphs beginning on line 1 through line 19 as follows:

The data storage 102 may be included in a network entity managed by the operator or another party. The data storage 102 may also be included in the mobile terminal 12. Different implementation possibilities will be described in the following description. The data storage 102 is configured to provide location dependent routing information for users of the network. In the following examples the routing information associates with calls to and from the mobile station 12. This location dependent routing information may then be used for establishing connections over the communication system comprising one or more communication networks such that the routing is based on the location of the mobile station 12. There are various ways of implementing this, and some of the possibilities will be described by a ~~ways~~way of example below.

The routing information may be associated with individuals who can be contacted via a terminal connected to the communication system. These individuals may be selected by the user of the mobile station from a set of routing information, for example as a personal dialling list of the user, see for example the list 22 appearing in Figure 5. The individuals may also be selected from another set of routing information, for example as a company sub-list of a group of persons working together. Naturally, any other appropriate way of grouping the individuals may be used.

At page 7, please amend the paragraphs beginning on line 10 through page 8, line 14 as follows:

A specific example of the event may be detection that the operator of the network is different from the network the mobile station subscribes to. For example, whenever the terminal notifies that the current network is changed, it may check if there is specific contact database or set of routing information for the current country. If there is, that contact database or set of routing information is set as an active contact database or active set of routing information. Otherwise the international or other default contact database or set of routing information is set as the active contact database or active set of routing information.

The mobile station can be made aware of the network into which it has roamed in various ~~manner~~s~~ways~~. The mobile stations may detect the change in the operator e.g. based on the operator indicator received from the base station during the network registration process. Other possible identities are cell ID, or another identity associated with a base station of the communication system. Another possibility is that the mobile station itself determines information regarding the location thereof. Such a location information may also be provided e.g. by the so called location information services (LCS) associated with the mobile network, or by a satellite based positioning system, such as the GPS (Global Positioning System).

According to another embodiment, location information may include additional status parameters related to at least one mobile terminal. Such parameters may include presence information in the form of a dynamic profile of the user, visible to ~~other~~others and used to represent oneself, ~~share~~reshare information and control services. Furthermore, the parameters may include being within range of supported alternative network that uses wireless local area network (WLAN) technology, personal area networking (PAN) technology such as Bluetooth, or other parameters related to context awareness.

The embodiments may be advantageous, for example, in a distributed calling mechanism that may reduce roaming costs in case of mobile users belonging to a certain group, such as employees of a company. Such a mechanism is discussed in

more detail in the following with reference to embodiments wherein a roaming mobile station may initiate a call to or receive a call from ~~other~~another party by means of location dependent routing information provided by the routing server 20.

~~A reference~~Reference now is made to Figures 4 and 5 showing two examples of communications systems wherein the invention may be embodied. The exemplifying communication systems are shown to comprise different communication networks 1, 8, 10, 11. User equipments or terminals connected to respective networks and enabling communication between the users thereof are also shown. More particularly, mobile terminals or stations 2, 12 and a fixed line terminals 6, 16 are shown.

At page 8, please amend the paragraph beginning on line 23 as follows:

The terminals 2, 6, 12 and 16 may be associated with an ~~organisation~~organization whose employees may use their mobile stations in at least two networks, such as in two countries. In the following examples such ~~organisation~~organization will be referenced to by the term 'company' or 'corporate'. However, the terms company or corporate shall be understood broadly as referring to any ~~organisation~~organization or similar providing a number of users with mobile and other subscriptions. Such ~~organisations~~organizations include, without any intention to be limited to these, government bodies, international and national associations, the United Nations or various ~~sub-organisations~~sub-organizations thereof, trade ~~organisations~~organizations and so on. Such ~~organisations~~organizations may also comprise a third party, such as a commercial service provider.

At page 9, please amend the paragraph beginning on line 14 as follows:

Each of the mobile communication networks 1, 11 may comprise various network elements such as base stations 3, 13, mobile switching ~~centres~~centers (MSC) 5, 15 and associated registers such as home location registers (HLR) and visited location

registers (VLR). The same applies also for the network 100 of Figure 1. It shall be appreciated that although not shown in Figures, a mobile telecommunication network typically comprises further network entities such as base station controllers and/or radio network controllers, support nodes, gateways and so on. The skilled person is familiar with the required elements of a mobile telecommunication network, and therefore these elements are not discussed in more detail herein. As these elements do not form an essential part of the invention they are omitted from Figures for clarity.

At page 9, please amend the paragraph beginning on line 34 through page 10 as follows:

The IP based system 10 may be adapted to provide the so called Voice over IP (VoIP) backbone for the company. The skilled person is familiar with the concepts of IP based communication networks and VoIP backbones, and therefore these are not explained in any greater detail. It is sufficient to note that the IP is a packet switching protocol that is widely used for the inter-~~organisational~~organizational data communication networks. The VoIP backbone can be used for establishing voice calls between terminals connected to the IP system 10.

At page 11, please amend the paragraphs beginning on line 3 through line 17 as follows:

The routing server 20 may also contain a specific set of routing information, for example a ~~so-called~~so-called corporate directory phonebook and related user information that may be communicated to the terminals, with or without a request. The server may have capabilities to automatically update contact information in the terminal, provide automatic backup for contacts entered by the user manually and to

automatically ~~recognise~~recognize and resolve synonymous names in the contact information.

The routing server 20 may receive location information any time when a terminal, such as the mobile station 12, enters a network or a location area, i.e. when the location of a terminal in the communication system changes. Examples of such situations may be when the roaming situation of a mobile station is ~~recognised~~recognized or when a terminal is switched on. In such a situation, the terminal may send a message preferably automatically to the routing server. The routing server may also receive location information at regular, predetermined intervals.

At page 11, please amend the paragraph beginning on line 29 as follows:

~~The~~As mentioned, the mobile terminal also comprises memory means 310. In the present embodiment, the memory means 310 are adapted to store routing information received from the routing server 20. When a terminal requires routing information, an appropriate set of routing information or a part thereof may be provided to the terminal. An appropriate set of routing information may also be provided to a terminal automatically when the terminal provides the routing server 20 with information about its location, for example.

At page 12, please amend the paragraph beginning on line 25 as follows:

~~A reference~~Reference will now be made to the flowchart of Figure 6 illustrating operational steps in accordance with an embodiment. In step 600, a plurality of sets of routing information are stored in a memory means of the mobile terminal. When the mobile terminal enters to a network, the set of routing information associated with the network is selected from the sets of routing information at step 602. A connection may then be set-up between the mobile terminal and another terminal by means of the selected routing information at step 604.



At page 13, please amend the paragraph beginning on line 27 through page 14 as follows:

A routing information client sends automatically a short message to a service number associated with the routing server, or with another entity storing the location dependent information in the data storage, when the client ~~recognises~~recognizes a roaming mobile station. In the following, routing server is used to denote the entity storing the location dependent information in the data storage. However, it shall be appreciated that the entity may be any other appropriate network entity, certain examples of which are given in this description. The client can ~~recognise~~recognize roaming e.g. based on changed operator identity. The identity information may be included in the short message. When the routing server receives the short message, it updates the location information in the data storage based on the identity information.

At page 14, please amend the paragraph beginning on line 35 through page 15 line 12 as follows:

Referring back to Figure 4, in accordance with an embodiment, a company responsible for the costs for calls from and to terminals 2, 6, 12 and/or 16 may have set up at least one network-based access point (AP) entity 4, 14. The AP entities may be provided in association with the home network 1 and in at least one foreign country. In Figure 4 the latter is provided in association with the visited network 11. The AP entities may provide the terminals 2, 6, 12 and 16 connected to the respective networks with access points so that the terminals may have connections over the third communication network 10. The AP entities 4,14 are able to communicate via the IP system 10 of the company employing the users of mobile stations 2 and 12. It shall be appreciated that the users of mobile stations or other terminals need not ~~to be~~ employees of the company operating the communication

network 10. This definition is given for illustrative purposes only. Furthermore, the users of terminals need not to subscribe the same network.

At page 15 please amend the paragraph beginning on line 27 as follows:

The AP entities 4, 14 shown in Figure 4 are only an example of possible access points. Possible access point implementations may also comprise mobile virtual private network (VPN) media gateway or other VoIP boxes with break-in and/or break-out capabilities, calling card access number or a tailor-made access point with wide range of options. The implementation depends on various aspects. ~~Most~~More elaborate solutions may be needed in ~~optimising~~optimizing calls received in a roaming situation or relating to voice dialling.

At page 16, please amend the paragraph beginning on line 7 as follows:

The mobile station or the routing server may take care of the managing and creation of such number combinations. The mobile station or the routing server may create a network-specific set of routing information, so-called sub-list, of a larger data storage, so-called contact database. Such a sub-list may comprise the AP number plus the actual contact number stored in the contact database. For example, when a Finn goes to Germany, the routing server can provide the Finnish country-specific list with the local German AP for that particular visiting user when the user is registered with the local AP. A general set of routing information or a network-specific set of routing information may be shared by a plurality of users. The contact database may be stored in the memory means of the mobile terminal or in the routing server.

At page 16, please amend the paragraphs beginning on line 31 through page 17, line 15 as follows:

The embodiments enable use of name-based dialling when the mobile station is abroad, or otherwise roaming, as well as in the home network. The routing server comprising a contact database may be used to in provision of data to roaming users such that a name may always be linked with desired, updated routing information. The number linked with the name may be updated in the routing server in an appropriate manner, for example in relation to a registration process as described in the following or then a roaming mobile station may select the appropriate routing information among information ~~sendsent~~ from the roaming server.

The name-based dialling system routes the call from the roaming mobile station in accordance with a name selected from a list stored in the mobile station, spoken to the mobile station or otherwise input into the mobile station. The user of the roaming station may access the system by dialling a short access number, e.g. '444', regardless the country the roaming user is in at the-very moment. Having such a number for a company e.g. all over the-Europe in each country, a corporate traveller can call any of his/her colleagues just by giving the full name of the called party. The location and thus the routing information of the called party may then be retrieved from the contact database. Having a replica of user's personal dialling list on the routing server, the roaming user is enabled to call via the service any of the names appearing in the user's personal contact list.

At page 17, please amend the paragraph beginning on line 27 as follows:

When the user of the mobile station 12 arrives to a visited network, for example a foreign country, the mobile station 12 may register into the local operator's network 11 in a state-of-the-art manner. The registration process may be handled by the mobile switching ~~center~~center and visitor location register (MSC/VLR) 15. As the registration process as such is well defined by appropriate mobile telecommunication standards, it will not be discussed in here in more detail. It is

sufficient to note that the registration may be required e.g. for the purposes of providing required call routing and charging information.

At page 19, please amend the paragraph beginning on line 5 as follows:

An appropriate sub-list of the contact database or another appropriate list, such as a list of APs may become available to the mobile station automatically, for example when the roaming situation is recognized in relation to the registration process. In the context of the registration process, the sub-list may be automatically selected by the mobile station based on the country or other specific location where the mobile station is roaming. The automatic selection may be initiated by the mobile station, by any appropriate entity of the network the mobile station is connected to or by an entity of the ~~organisation~~organization.

At page 21, please amend the paragraph beginning on line 31 through page 22 line 3 as follows:

Some applications may require communication of other information between the routing server, the connection management entities, the terminals and/or other network entities. For example, information such as roaming mobile subscriber numbers or other temporary numbers may need to be signalled between the respective connection management entities and appropriate network entities of the home and/or visited networks (for example, the HLR of the subscriber and/or the visited location register of the roamed network). The number for voice mail service ~~centre~~center and the number for short message service ~~centre~~center may need to be changed.

At page 22, please amend the paragraph beginning on line 30 as follows:

Some of the embodiments are described above in the context of a third network. It shall be appreciated that the third network 10 is not necessary for the implementation of the invention. For example, the communication may be routed via only two networks in an ~~optimised~~optimized manner based on the location of the mobile station. The ~~optimisation~~optimization may be based on various factors, such as the price, quality, capacity and reliability of the communication paths on offer.